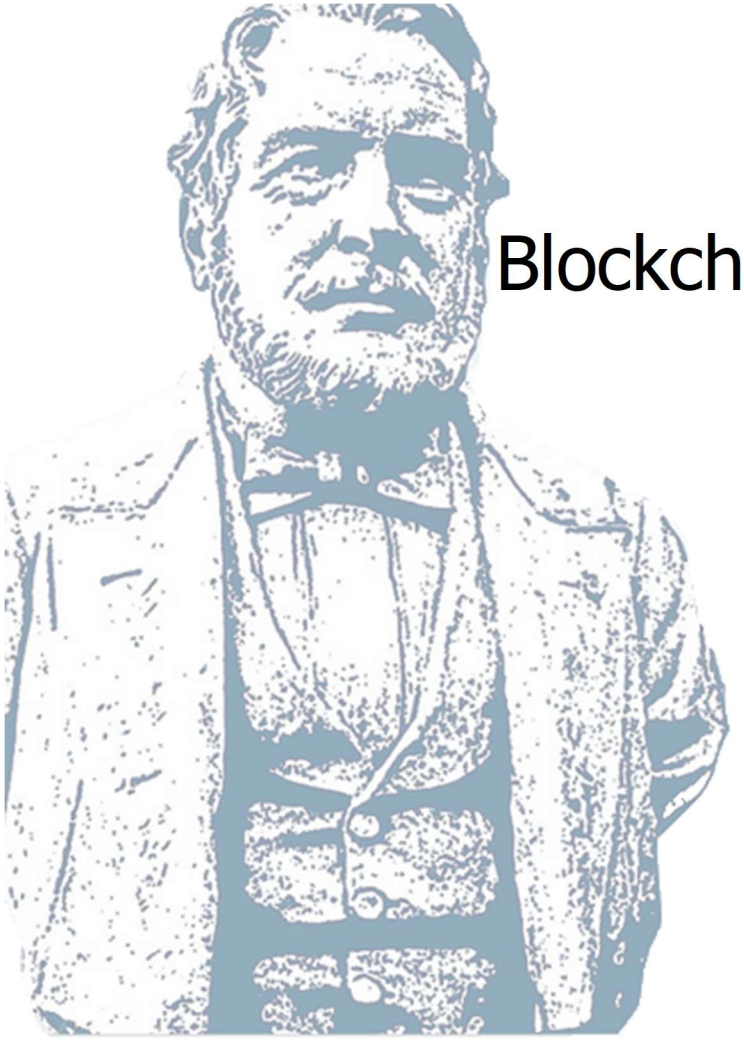

Blockchain Technology (BCT)

Arbeitsbericht

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04/2020

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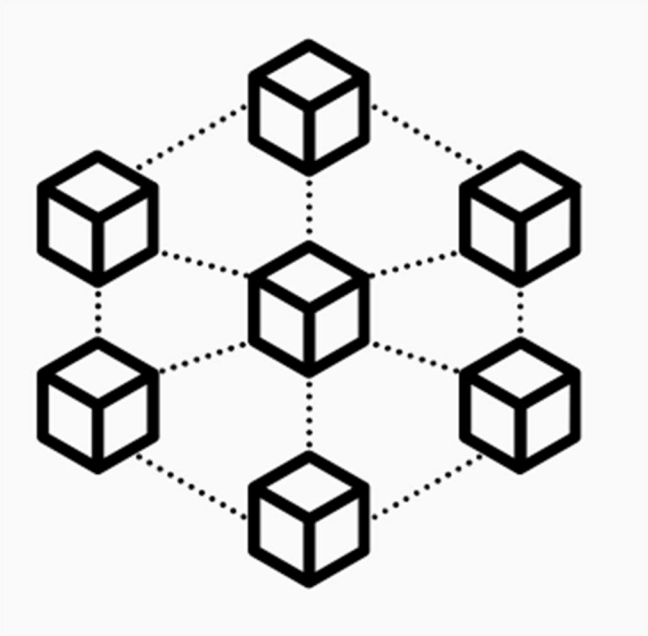

Figure 1: Blockchain Technology

Definition & Relevance

BCT enables a governed value exchange between assets in a peer-to-peer (p2p) network. Two main problems that are solved by BCT are the Double Spending Problem and Byzantine General's Problem. First, BCT provides a mechanism to prevent users from spending the identical amount of value twice, like what banks prevent in a central system. Second, in a network where no central unit exists, BCT provides the trusted counterpart in a decentralized network. A blockchain is created by saving transactions in a block. The block is then cryptographically concatenated to the previous block forming a chain of blocks, a blockchain. The blockchain is described as permanent, transparent, pseudonym and tamper-free. An example of how the blockchain works can be seen here.

Protocols

BCT as a protocol can serve as a supporting layer for storage systems. It then provides functionalities to track and validate entries in the network. BCT shows an architectural decentralization. Logically, it is centralized because it is based on a common agreed state and behaves like a single system. Political decentralization is achieved because no entity controls the protocol and decisions are made based on consensus of the network [1]. One example of a BCT protocol is Ethereum. Ethereum is an open-source platform based on a public blockchain protocol that was conceptualized by Vitalik Buterin 2013 and went live on 30th of July 2015. The goal of the project is the provision of a "trustful object messaging compute framework" as a "transaction-based state machine". Further examples can be found under the following links: [2, 3].

Use-Cases and Benefits

BCT has been adapted in different domains for different purposes. The focus of integration is on the enablement of automation and creation of competitive advantages. Thus, BCT is gradually gaining acceptance and has been implemented in various industries. This link shows current applications of BCT**.**

- Immutable Data
- Pseudonymity & Privacy
- No centralized party
- Stakeholder Accountability
- Trust
- Security
- Traceability
- Transparency
- Scalability

The benefits outlined can be practically applied to any industry. A thorough understanding of these benefits and its implementation yields a competitive advantage [4, 5, 6, 7].

Application and Limitation [8, 9]

Application	Limitations
• To remove third party who may complicate trust in the system • Establish Transparency and Security • Build Decentralized Applications • Protocol on sending, receiving, and recording • Immutability of the data	• Expensive storage systems • More nodes lead to higher processing time • Immutability of the data stays in conflict with GPDR • Anonymous 51% attack could collapse the system but are unlikely

Scaling Solutions

The BCT community has been working on scaling solutions for the past decade. The scaling solutions are designed on different layers and some layers have been implemented and are running on the main BCT [10].

Getting Started

At the basic level, the references [11, 12, 13, 14, 15] provide a high-level overview of BCT. They give a start-up view on programming tools and concepts behind BCT.

Conclusion and Future Work

BCT provides trust and governance between entities of a distributed data landscape. To have confidence in a system it is essential to have a trustworthy and secure system. BCT is still an emerging technology and its implementation requires technical skills. Nevertheless, more than 1000 BCT based Decentralized Applications (DApps) were developed on Ethereum alone over the years, which shows developer acceptance. A reliable system ensures compliance with regulations, reduces potential costs, and increases customer satisfaction. However, technical challenges and limitations need to be addressed to also generate user acceptance and business integration.

Following, see further links for information.

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Further links:

16. https://www.blocklab.de/newsletter/

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